

REMARKS

Upon entry of the present amendment, claim 14 will have been amended to clarify the features of Applicants' invention. In view of the herein contained amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejection set forth in the above-mentioned Official Action together with an indication of the allowability of claim 14 pending herein. Such action is respectfully requested and is now believed to be appropriate and proper.

Initially, Applicants note that the amended feature of “providing a first metal electrode layer on the dielectric layer inside the trench as a second conducting capacitor plate” was previously recited in claim 14 in substantially the same form. Additionally, the amended feature of “etching back the conducting filling material” was previously recited in claim 14. In this regard, Applicants submit that the amendments to the above-noted features are made to improve the form of claim 14 by reciting the features in a more logical order. However, Applicants respectfully submit that the above-noted amendments do not add new matter to the application. Additionally, the above-noted amendments do not narrow the claims and thus should not be considered to create estoppel to the presently claimed invention. Rather, the remarks set forth herein establish that the reference applied in the outstanding Official Action does not disclose or suggest the invention recited in claim 14 either before or after the current amendments.

In the outstanding Official Action, the Examiner rejected claim 14 under 35 U.S.C. §102(e) over WEI et al. (U.S. Patent No. 6,251,722). In this regard, the outstanding Official Action asserts that “Wei et al... discloses... providing... a second (361) conducting capacitor plate in the trench (fig. 3)... filling a conducting filling material (362) into the trench... providing a first metal electrode layer (361) on the dielectric layer (351) inside the trench as the second conducting capacitor plate... providing a second electrode layer (362) into the upper region of the trench by etching back the conducting filling material such that the second metal electrode layer is in electrical connection with the first metal electrode layer (fig. 15, col. 4, lines 18-21)” (emphasis added). Applicants respectfully assert that at least the above noted assertions are incorrect for the reasons set forth herein. Furthermore, Applicants additionally submit that WEI does not disclose or suggest the features of amended claim 14.

In particular, Applicants respectfully assert that WEI does not disclose or suggest “providing a first metal electrode layer on the dielectric layer inside the trench as a second conducting capacitor plate”. Rather, WEI discloses a composition of a “second polysilicon layer 361” of an “upper electrode 36” on the dielectric layer 351. In this regard, the “polysilicon layer 361” in WEI is not disclosed to be a “metal electrode layer”.

Additionally, Applicants respectfully assert that WEI does not disclose or suggest “providing a second metal electrode layer in the upper region of the trench such that the

second metal electrode layer is in electrical connection with the first metal electrode layer". In particular, WEI discloses filling the trench 32 by depositing a "third polysilicon layer 362" of the "upper electrode 36" on the "second polysilicon layer 361". However, the "third polysilicon layer 362" is not disclosed to be a "metal electrode layer".

Applicants further submit that it appears that the second and third polysilicon layers in WEI are intentionally not made metallic in contrast to the explicit recitation of claim 14 in the present invention. Rather, WEI specifically notes the use of a metal (Arsenic) in the ASG layer 51 in forming the n-type impurity diffusion layer 33 of the bottom electrode 40 by diffusion. In contrast, no process involving a metallic element is disclosed or suggested with respect to "the second polysilicon layer 361" or "the third polysilicon layer 362". Applicants further submit that WEI does not provide any motivation to modify the "second polysilicon layer 361" or the "third polysilicon layer 362" in a manner that would obtain the invention claimed before or after the present amendments.

Applicants further note that the outstanding Official Action asserts that the feature of "filling a conducting filling material into the trench" is disclosed by the polysilicon layer 362 of WEI. As an example of this feature in the present application, Applicants direct the Examiner's attention to Figures 3c/3d or Figures 1i/1j. In this regard, Applicants have amended claim 14 to recite "etching back the conducting filling material to the upper side of the first conducting capacitor plate". With respect to the features of amended claim 14,

Applicants assert that the polysilicon layer 362 cannot be a “conducting filling material” that is etched “back... to the upper side of the first conducting capacitor plate”, as is recited in amended claim 14. Rather, the third polysilicon layer 362 shown in FIG. 15 is above the level of the “bottom electrode 40”, and the polysilicon layer 362 and not etched “back to the upper side” of a “first conducting capacitor plate” (the lower electrode 40 in WEI). In this regard, if the polysilicon layer 362 were etched back to the upper side of the lower electrode 40 in WEI, the polysilicon layer 362 would appear to be entirely eliminated.

Furthermore, the presently claimed invention provides advantages and benefits not provided by the invention disclosed in WEI. In particular, as shown with respect to the embodiment of FIG. 4, a first metal electrode film 100 is deposited using an ALD, ALCVD or a CVD method. The first metal electrode layer 100 is provided on the dielectric layer 70 inside the trench 2 as a second conducting capacitor plate. A second metal electrode film 100' is deposited and (anisotropically) etched back so that it remains in the upper region of the trench 2 (see the last paragraph of page 15). The second metal electrode layer 100' is provided in the upper region of the trench 2 in electrical connection with the first metal electrode layer 100, as depicted in FIG. 4. The provision of a structure of two thin metal electrode layers 100 and 100' provides a reduced electrical resistance in comparison to the trench capacitor of WEI. In particular, the two polysilicon layers 361 and 362 of WEI would provide a much higher resistance of the trench capacitor, in comparison with the present

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invention. Therefore, the presently claimed invention provides a significant benefit not achieved in WEI.

Accordingly, for each and all of the reasons set forth above, Applicants respectfully traverse the outstanding rejection of claim 14, and request the reconsideration thereof, together with an indication of the allowability of the claim. In this regard, Applicants submit that withdrawal of the outstanding rejection would be proper even if the amendments made herein were not made. Accordingly, no estoppel should attach as a result of the herein-contained amendments. Reconsideration and withdrawal of the outstanding rejection are respectfully requested and are now believed to be appropriate and proper.

SUMMARY AND CONCLUSION

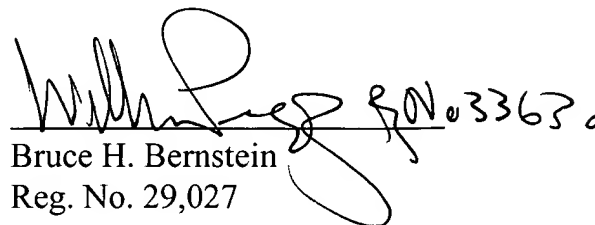
Applicants have made a sincere effort to place the present application in condition for allowance and believe that they have now done so. Applicants have amended claim 14 to clarify the features of the presently claimed invention. Furthermore, Applicants have discussed the disclosure of the reference relied upon by the Examiner and have pointed out the significant and substantial shortcomings thereof with respect to the claimed invention. Accordingly, Applicants have provided a clear evidentiary basis supporting the patentability of all the claims in the present application and respectfully request an indication to such effect in due course.

The amendments to the existing claim which have been made by the present amendment, and which have not been specifically noted to overcome the rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

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Should there be any questions concerning this application, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,  
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